International Journal of Advance Research in Science and Engineering
Vol. No.6, Issue No. 09 , September 2017
www.ijarse.com
IJARSE
ISSN (O) 2319 - 8354
ISSN (P) 2319 - 8346

A REVIEW PAPER ON

RECENT DEVELOPMENT IN ABRASIVE GRINDERS

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ABSTRACT

In most of the industries grinding is the final stage in manufacturing process, there is no any further process. Grinding is a machining process which uses an abrasive wheel or belt type cutting tool. This grinding machine is used in various industries for finishing of work pieces and give high surface quality. Grinding with wheel or belt type cutting tool is used for different precision applications such as deburring in foundries and constructions, polishing, engraving and cut-off grinding. This paper highlights on recent development by using various power tools such as electric power tools & pneumatic power tools also by implementing robotic systems.

Keywords: Dexterity, Post-Grinding, Power tools, Roughness, Sculptured surfaces

I. INTRODUCTION

In most of the industries grinding is the final stage in manufacturing process, there is no any further process. The aim of development is to increase safety and efficiency of grinding machine which will affect the industrial profit. Since to obtain a good finishing of work piece and mass production the various developments are recently carried out in industries. During grinding operation facing problems of flexibility, spark generation in electric power tools which are hazardous. Because of that types of problems the different types of power tools such as electric and pneumatic and smart intelligence robotic systems are used.

1.1 Basics of grinding:

Grinding employs an abrasive product, usually a rotating wheel brought into controlled contact with a work surface. The grinding wheel is composed of abrasive grains held together in a binder. These abrasive grains act as cutting tools, removing tiny chips of material from the work. As these abrasive grains wear and become dull, the added resistance leads to fracture of the grains or weakening of their bond. The dull pieces break away, revealing sharp new grains that continue cutting. Another aspect of grinding wheels is their pore structure or density, which refers to the porosity between individual grains. This pore structure creates spaces between the grains that provide coolant retention and areas for the chips to form. Dense wheels are best for harder materials, while more open densities are better for the softer metals.

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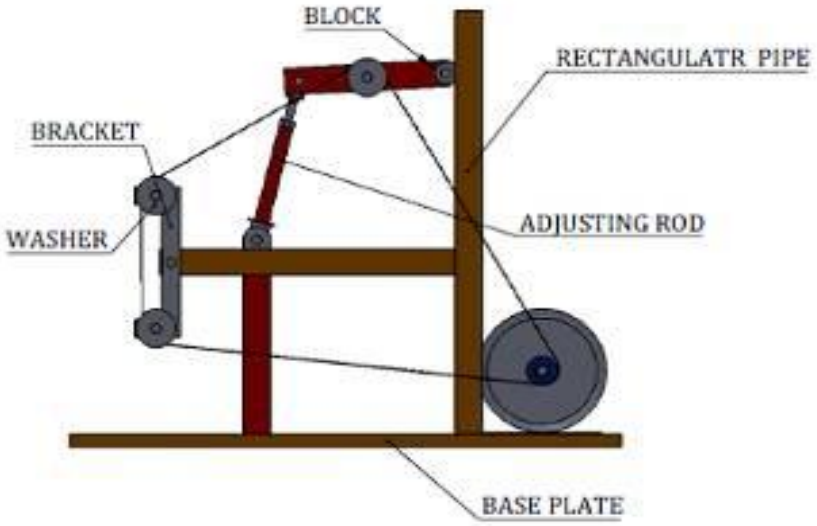
1.2 Belt grinding machine:

Belt grinding is an abrasive machining process used on metal and another material. A belt coated with a abrasive material, which run on a workpiece and remove material and produce a finish product. A wide belt grinding machine can be constructed with single or multiple heads. First head is made for coarse grinding and next head gradually make a finish product.



II. LITERATURE REVIEW:

In this section the various modification and development in the grinding machine technology are mentioned.

[1] Kyle Odum , Mara Celeste Castillo, Jayanti Das, Barbara Linke, *Sustainability analysis of grinding with power tools, 6th CIRP International Conference on High Performance Cutting, CIRP 14 (2014) 570-57.*This paper discuss issue relating to the power supply, occupational Health hazard and advertised sustainable feature of abrasive power tool and abrasive media option in market today. The most common power sources are electricity through the universal motor are lightweight easy to control, and have desirable operating characteristic. It will operate at less than 50% efficiency due to friction between commutator and brush in a universal motor cause wear and limit inspection of motor. Also another sources of motor are Brushless Permanent magnet motor which have very high efficiency 80-90% more than universal motor. Aside from electric power tool, pneumatic power tool that run on a compressed air are the most common in the U.S. Some advantages are: the lack of electric shock Hazards, absence of spark or ignition sources and lightweight during operation.

[2] Konrad Wegener, Friedrich Bleicher, Peter Krajnik, Hans-Werner Hoffmeister, Christian Breecher, *Recent development in grinding machines, CIRP-1703*. In this paper the main objective is development of grinding machines to improve the productivity. In this paper the detailed study of grinders is explained. The various key points like peculiarities of grinding machines, classification, trends in development of abrasive processes, grain technology, cost, market developments, maintenance, digitization, trends for grinding machine, grinding machine material structures, machine concept and simulation, adaptive and Mechatronics system for grinding, energy efficiency, trends in auxiliary devices, special machine developments such as ultra precision machines

IJARSE
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and its principle applications, hybrid machines, combined machines which are capable of executing different locations. The authors has concluded day to day in recent years for getting more productivity in manufacturing.

[3] Vigneashwara Pandiyan, Tegoeh Tjahjowidodo, Meena Periya Samy, *In-Process Surface Roughness Estimation For Compliant Abrasive Belt Machining Process, 7th HPC 2016- CIRP Conference on High Performance Cutting, CIRP 46 (2016) 254-257.* In this paper surface roughness inspection is an off-line operation which is time consuming in robotic abrasive belt machining process with Support Vector Machine (SVM). Predictive model such as ANN, ANFIS and SVM were developed in this researches and correlation were established between predicted surface roughness values .The technical features based on SVM such as Linear SVM, Quadratic SVM, Cubic SVM with four different surface roughness. By performance testing it is observed that Quadratic SVM and Cubic SVM were the best in terms of predictive ability. The accuracy of SVM's are 94.5%, 96.9% and 96.9% respectively. This technique is established on planar surfaces while machining free from surfaces are subject to further research.

[4] Dong Zhang, Chao Yun, Dezheng Song, *Dexterous space optimization for robotic belt grinder, Procedia Engineering 15 (2011) 2762-2766.* In this paper discussed a new structure of robotic grinding system in which a new robot frame including active work piece frame and passive tool frame was presented. In the industrial robot are recently introduced to the belt grinding of complex shape surfaces to obtain high productive efficiency and constant surface quality. The early development of robotic grinding focused on the robot holding a grinding wheel to finish a part with simply geometries and with relatively low accuracy requirements. The dexterity optimization ends are first, the establishment of an appropriate coordinate system for the general theoretical analysis; second, the robot placed in reasonable relative position to grinding machine ensuring that the robot has enough dexterous space of grinding

[5] Wang Wei, YUN Chao, *A path planning method for robotic belt surface grinding, Chinese journal of aeronautics 24 (2011) 520-526.* The robotic belt grinding system is widely used to grind the sculptured surfaces and the grinding are generated by off-line planning method. In this paper the effective method for the linear approximation error is to reduce the step forward distance and increase the number of cutter locations. Generally, the curve length between the neighbouring cutter locations on the target surfaces must be 1-2mm by the robotic belt grinding system. With the optimization algorithm the accuracy and efficiency of belt grinding are integrated.

[6] J.F.G. Oliveria, E.J. Silva, C. Guo, F. Hashimoto, *Industrial Challenges in grinding, Manufacturing Technology 58 (2009) 663-680.* This paper aims at the analization of grinding technology development research as per industrial demand. The author have totally focused on the grinding challenges in industries. The very important driving force development of grinding are automotive application. There were many problem presented by industries needs at the time include today well developed technology such as fast and automotive wheel balancing system, flexible and prediction systems, more application of CNC in grinding process, multiple grinding on one step and other.

[7] A. Robert Henry, R. Anbazhgan, A. Kevinraj, M. Sudhagar, G.S. NIvas, *Design and Fabrication of Abrasive Belt Oblique Grinding Machine, Vol 5, Special Issue 8, May 2016.* This paper highlights on belt grinding machine also it will explain the material used in a belt grinder. In next step it will explain abrasive process: An abrasive is material that is used to shape and finish a workpiece through rubbing which lead to part of workpiece

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being worn away. In final stage it will discuss on Grit, Grate and structure: The grains, commonly called grits, have rough edge, often terminating in point which will decrease surface area and increase localized contact pressure.

[8] Awhale M.J, Chinchlkar N.C, Gunjawate V.P, Phule N.S, Prof. Amrute A.V, *Surface Belt Grinder for Keys-A Review, vol 2, Issue 2, October 2015- March 2016.* This paper discussed the belt abrasive machining process and included substances final background work, which provide a solid base under condition of behavior of the abrasive machining process can be monitored. The abrasive belt can electively be cleaned by the appropriate cleaning technique. Thus, the system is able to super finish the shaft key, coupling keys etc.

[9] Lubica ELEKOVA, Zdenko LIPA, *Comparison Of Conventional And Structured Abrasives, 2009.* This paper described two type of abrasive belts. First one Conventional abrasive belt and Structured abrasive belt. Structured abrasive are increasingly used in practice, due to, this abrasive saves and reduces working time and guarantess cutting costs.

[10] Titan Miao, *Study on Influencing Factors of Sanding Efficiency of Abrasive Belts in wood Material Sanding, 59 (5); 2014 835-842.* The aim of this paper was to explore the correlation between the sanding efficiency and the surface quality, provided a standard for judging the end of belt life in the actual production. The highest sanding efficiency was obtained by MDF when sanded with 60 grits abrasive belt, while manuchurian ash acquired the lowest sanding efficiency when sanded with 100 grit abrasive belt in longitudinal direction. The smaller granularity belt seemed to be more suitable for precise sanding of wood products, while the bigger granularity abrasive belt was more appropriate to improve productivity in the wood processing industry.

IV. CONCLUSION

From the above literature review the recent development in grinding machine by implementing various power tools and smart intelligence robotic system to increase the efficiency, productivity, accuracy in surface finish and various beneficial parameters are observed. The effect of this developments on the cost of system is also considered. Also the typical robot belt grinding system an industrial manipulator, belt grinder and work piece is studied. The technology development is highlighted in this review section.

REFERENCES

[1] Kyle Odum , Mara Celeste Castillo, Jayanti Das, Barbara Linke, Sustainability analysis of grinding with power tools, 6th CIRP International Conference on High Performance Cutting, CIRP 14 (2014) 570-57.

[2] Konrad Wegener, Friedrich Bleicher, Peter Krajnik, Hans-Werner Hoffmeister, Christian Breecher, Recent development in grinding machines, CIRP-1703.

[3] Vigneashwara Pandiyan, Tegoeh Tjahjowidodo, Meena Periya Samy, In-Process Surface Roughness Estimation For Compliant Abrasive Belt Machining Process, 7th HPC 2016- CIRP Conference on High Performance Cutting, CIRP 46 (2016) 254-257.

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[6] J.F.G. Oliveria, E.J. Silva, C.Guo, F. Hashimoto, Indutrial Challenges in griding, Manufacturing Technology 58 (2009) 663-680.

[7] A. Robert Henry, R. Anbazhagan, A. Kevinraj, M. Sudhargar, G.S. Nivas, Design and Fabrication of Abrasive Belt Oblique Grinding Machine, Vol.5, Special Issue 8, May 2016.

[8] Awhale M.J, Chinchkar N.C, Gunjwate V.P, Phule N.S, Prof. Amrute A.V, Surface Belt Grinder For Keys-A Review, Vol 2, Issue 2, October 2015- March 2016.

[9] Lubica ELEKOVA, Zdenko LIPA, Comparison Of Conventional And Structured Abrasives, 2009.

[10] Titan Miao, Study On Influencing Factors Of Sanding Efficiency Of Abrasive Belt In Wood Materials Sanding, 59 (5): 2014, 835-842.